

***Summary Report for the 2004
Time-Critical Removal Action
for Unexploded Ordnance at
Operable Unit 10-04***

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**Idaho
Completion
Project**

Bechtel BWXT Idaho, LLC

July 2004

ICP/EXT-04-00437
Revision 0
Project No. 23368

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Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental Management
Under DOE Idaho Operations Office
Contract DE-AC07-99ID13727

ABSTRACT

On April 23 and 24, 2004, the Idaho National Engineering and Environmental Laboratory implemented a Time-Critical Removal Action near the Central Facilities Area and Idaho Nuclear Technology and Engineering Center. The objective of the action was to remove, transport, and destroy unexploded ordnance. The unexploded ordnance was picked up, transported to the Mass Detonation Area, and destroyed by high-order detonation. Several dozen live explosive items were recovered and destroyed during the project. This action eliminated the risk to site personnel from these live and fused munitions.

CONTENTS

ABSTRACT.....	iii
CONTENTS.....	v
ACRONYMS.....	vii
1. INTRODUCTION.....	1
1.1 Description of the Ordnance Removal Areas.....	1
1.1.1 Naval Ordnance Disposal Area.....	1
1.1.2 Craters East of Idaho Nuclear Technology and Engineering Center Site.....	4
1.2 Description of the Detonation Area.....	4
1.3 Considered Actions	4
1.4 Applicable or Relevant and Appropriate Requirements.....	4
2. DESCRIPTION OF THE REMOVAL ACTION.....	7
2.1 Work Area-Specific Tasks	7
2.2 Transportation	8
2.3 Detonation Area Tasks	8
2.3.1 Detonation Area Preparation.....	8
2.3.2 Detonation Preparation.....	8
2.4 Detonation and Post-Detonation Evaluation	8
3. REFERENCES	9

FIGURES

1. Unexploded ordnance areas at the Idaho National Engineering and Environmental Laboratory	2
2. Location of unexploded ordnance removed from near the Naval Ordnance Disposal Area.....	3
3. Location of unexploded ordnance removed from location east of the Idaho Nuclear Technology and Engineering Center	5
4. Location of the Mass Detonation Area	6

ACRONYMS

ARAR	applicable or relevant and appropriate requirement
DOE	U.S. Department of Energy
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MCP	management control procedure
NODA	Naval Ordnance Disposal Area
PLN	plan
UXO	unexploded ordnance

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1. INTRODUCTION

Before nuclear reactor research began in 1949, military activities (e.g., aerial bombing practice, naval artillery testing, explosives storage bunker testing, and ordnance disposal) took place on a large portion of what is now the Idaho National Engineering and Environmental Laboratory (INEEL). Because of these past activities associated with the former Naval Proving Ground, INEEL personnel occasionally discover unexploded ordnance (UXO) devices. Figure 1 shows the ordnance areas on the INEEL.

In 2000, a range fire revealed over 50 live and fused UXO between the Central Facilities Area and the Test Reactor Area that was probably related to activities at the Naval Ordnance Disposal Area (NODA). Additionally, several live UXO discovered east of the Idaho Nuclear Technology and Engineering Center (INTEC) were included in this action. To eliminate the risk to site personnel from these devices, the INEEL developed a plan to clear and detonate these UXO as defined in the *U.S. Department of Energy Idaho Operations Office, Lead Agency Action Memorandum Time-Critical Removal Action for Unexploded Ordnance, Operable Unit 10-04, Idaho National Engineering and Environmental Laboratory* (INEEL 2003).

This summary report describes the work completed under the time-critical removal action. Under this time-critical removal action, UXO was removed from critical areas at the INEEL. The projectiles in these areas presented an imminent risk to INEEL personnel and the public. It was concluded from a site report by the Army Corp of Engineers explosive ordnance experts in May 1996 that these types of areas present risks that should be immediately addressed. The Army Corp of Engineers listed these types of sites with a risk assessment code of 1, which indicates an immediate hazard.

1.1 Description of the Ordnance Removal Areas

1.1.1 Naval Ordnance Disposal Area

The NODA site is located approximately 1.6 km (1 mi) northeast of U.S. Highway 20/26 between Mile Markers 266 and 267 and roughly 3.2 km (2 mi) equidistant from the Test Reactor Area, INTEC, and Central Facilities Area facilities at the INEEL, as shown in Figure 1. The U.S. Navy used the NODA as an ordnance and nonradioactive hazardous material disposal area during the 1940s. Dozens of UXO devices were removed during previous actions that focused mainly on the immediate NODA area. A live 5-in. anti-aircraft projectile was discovered by a well drilling crew approximately 2,000 ft from NODA. During a subsequent 2000 walk-down, several live projectiles were discovered in the NODA kickout area, but it was not until after a range fire burned the concealing vegetation that the relatively large number of projectiles became evident (see Figure 2). A kickout area containing raw explosives, metal fragments, and/or UXO surrounds all open air explosive disposal pits.

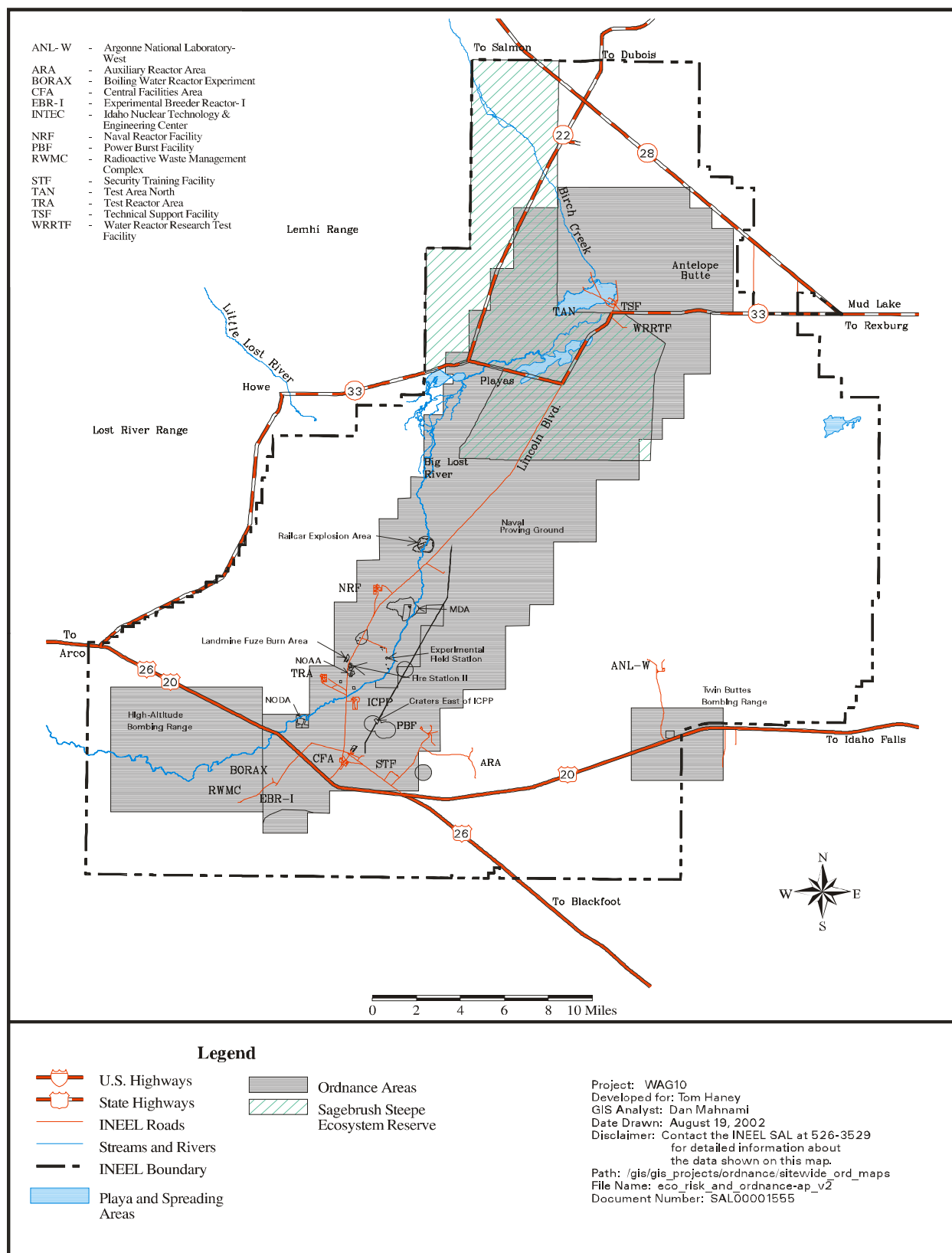


Figure 1. Unexploded ordnance areas at the Idaho National Engineering and Environmental Laboratory.

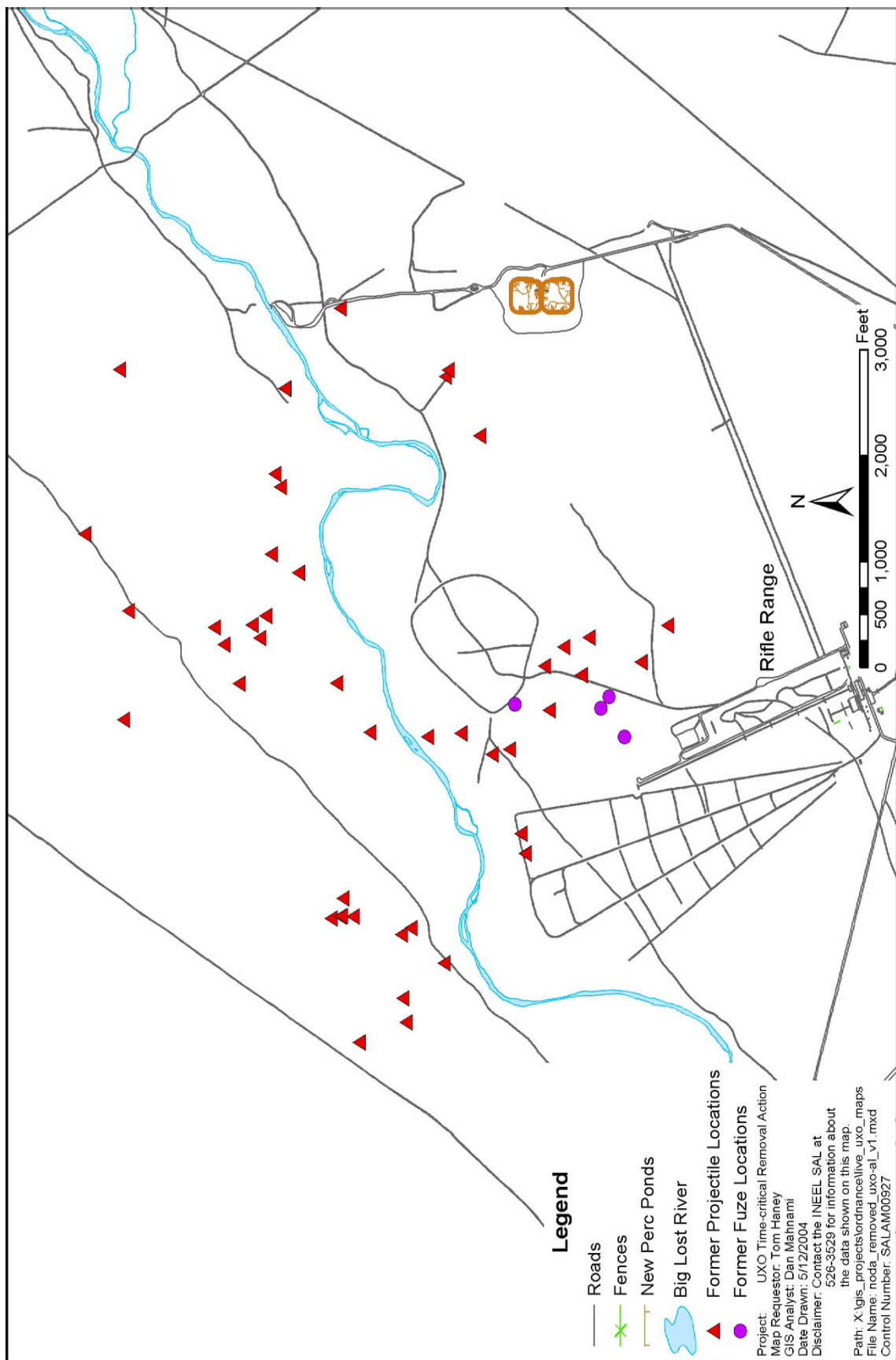


Figure 2. Location of unexploded ordnance removed from near the Naval Ordnance Disposal Area.

1.1.2 Craters East of Idaho Nuclear Technology and Engineering Center Site

Located approximately 0.5 mi southeast of the INTEC, this site included four UXO devices (see Figure 3). The area adjacent to and surrounding the UXO is littered with debris and pieces of explosives resulting from explosive tests or associated cleanup detonations. This area is within the impact zone of “extreme elevation” anti-aircraft proof firings from the Naval Proving Ground gun emplacements.

1.2 Description of the Detonation Area

The Mass Detonation Area is located approximately 1 mi east of Mile Marker 8 on Lincoln Boulevard, north of the INTEC and approximately 2 mi east of the Naval Reactors Facility, as shown in Figure 4. The site encompasses approximately 796 acres and was used in the 1940s for a number of small- to large-scale sympathetic and mass detonation tests with test shots ranging up to 500,000 lb of explosives. The MDA site includes numerous blast craters, and it is littered with UXO, pieces and chunks of explosives, shrapnel, and structural debris. More recently, craters in the MDA have been used for controlled detonations associated with UXO cleanup operations.

1.3 Considered Actions

The INEEL identified three options for the UXO:

1. Option 1 was to leave the UXO in place, which left a risk of uncontrolled, accidental, or deliberate detonation of the UXO.
2. Option 2 was to fence the approximately 1,700-acre area. However, the cost and difficulty would have been relatively high, would not have guaranteed restricted access, and would have left a risk of uncontrolled, accidental, or deliberate detonation of the UXO.
3. The DOE, U.S. Environmental Agency, and the Idaho Department of Environmental Quality chose Option 3, which included clearing and detonating the UXO.

1.4 Applicable or Relevant and Appropriate Requirements

The selected removal action alternative was protective of human health and the environment and was performed in a cost-effective manner. The removal action complied with the federal and state applicable or relevant and appropriate requirements (ARARs) identified for the scope of this action in Section 5.2 of the *U.S. Department of Energy Idaho Operations Office, Lead Agency Action Memorandum Time-Critical Removal Action for Unexploded Ordnance, Operable Unit 10-04, Idaho National Engineering and Environmental Laboratory* (INEEL 2003). The following subsections discuss chemical-specific, action-specific, and location-specific ARARs pertinent to this removal action.

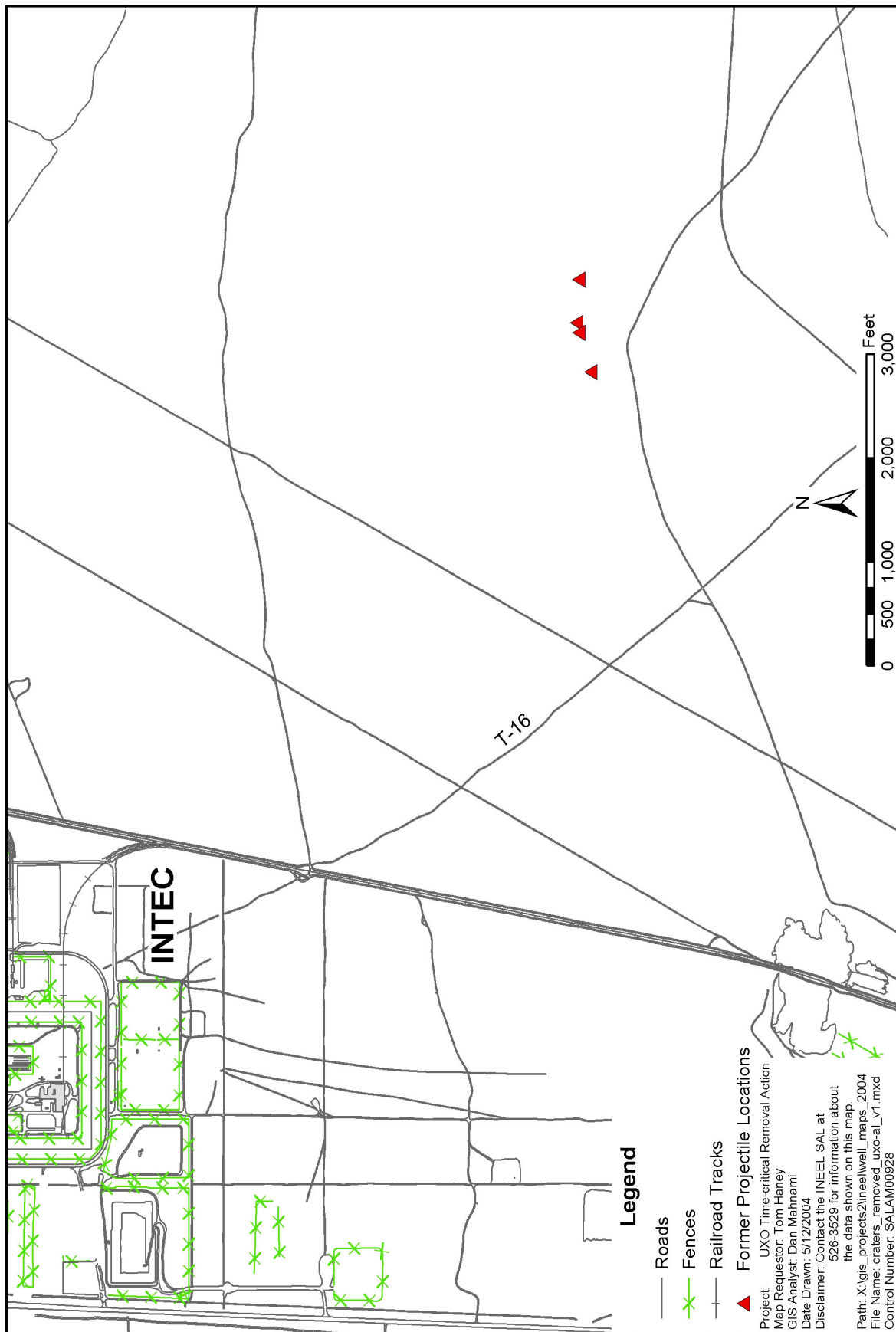


Figure 3. Location of unexploded ordnance removed from location east of the Idaho Nuclear Technology and Engineering Center.

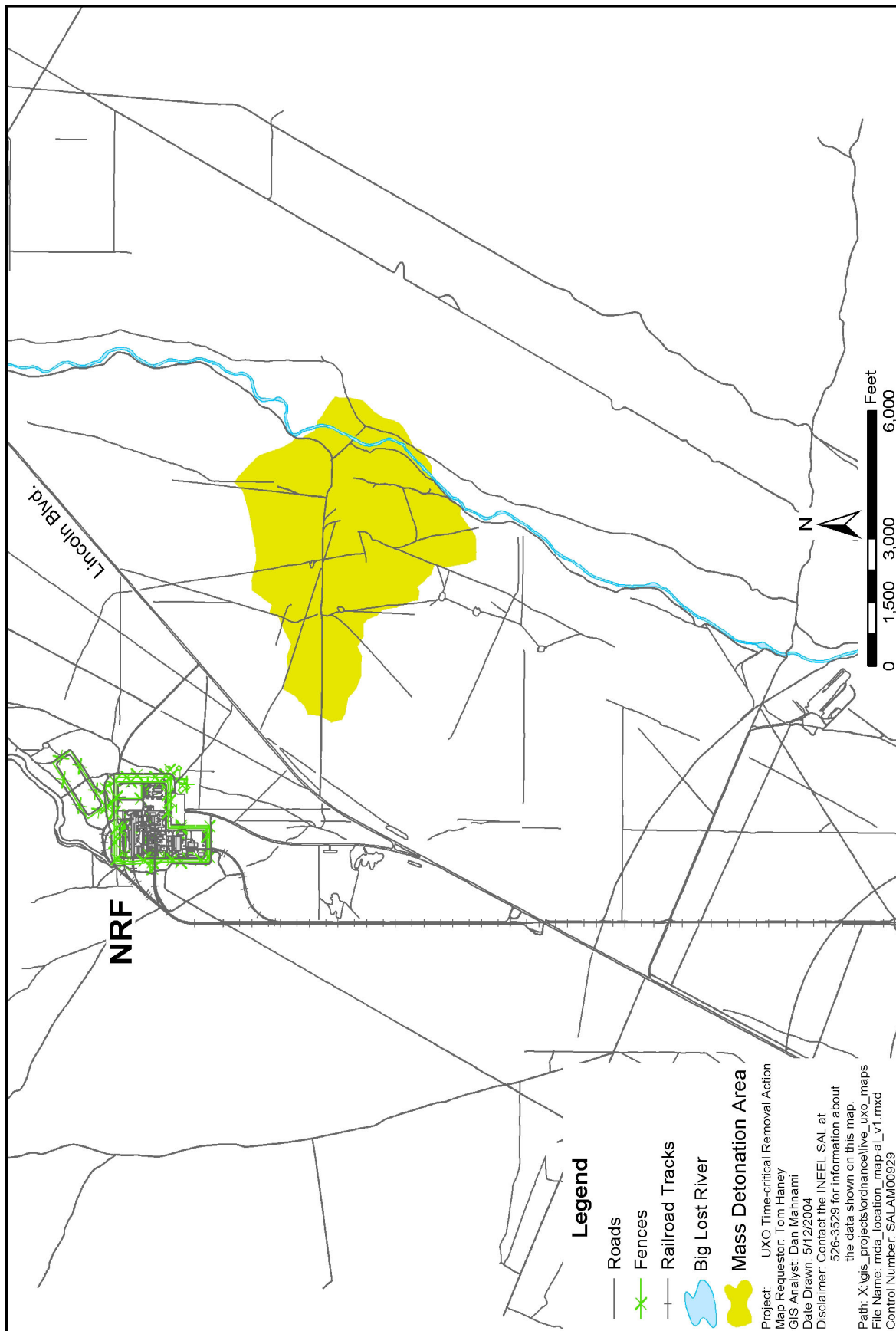


Figure 4. Location of the Mass Detonation Area.

2. DESCRIPTION OF THE REMOVAL ACTION

On April 23 and 24, 2004, the field team implemented the time-critical removal action near the Central Facilities Area and Idaho Nuclear Technology and Engineering Center. On these 2 days, the team inspected, removed, transported, and destroyed numerous live explosive items. This action eliminated the risk to site personnel from the live and fused UXO.

2.1 Work Area-Specific Tasks

The critical areas contained numerous live 5-in. anti-aircraft projectiles and fuses. These items contained quantities of high explosive that presented a large explosion hazard if detonated. The high explosive in the projectiles included trinitrotoluene, Royal Demolition Explosive, or ammonium picrate (Explosive D). The fuses contained tetryl. During planning, the project team pre-surveyed each projectile using Global Positioning System instruments so that they would be able to return to the exact points. During these Global Positioning System surveys, the INEEL explosive ordnance disposal-qualified health and safety officer determined that all the projectiles and fuses were likely to be safe to transport.

Upon returning to the UXO items during the removal action, the health and safety officer reexamined each one, making positive identification of the UXO type, filler, fuse, and condition before handling or picking it up. The health and safety officer made the final determination that they all could be safely transported. All the projectiles were exposed on the ground surface and no excavations were necessary. Each day, the field team moved as many UXO items to the Mass Detonation Area as was practical, and at the end of each workday, the field team detonated the items using an additional quantity of C4 explosive to initiate a high-order detonation. The following lists show the items that were destroyed on Friday, April 23, 2004, from NODA and east of INTEC, respectively.

The following items were recovered from NODA on Friday, April 23, 2004:

- Nine 5-in. anti-aircraft common rounds
- Five fuzes.

The following items were recovered from east of INTEC on Friday, April 23, 2004:

- Four 5-in. anti-aircraft common rounds.

The following items were recovered from NODA on Saturday, April 24, 2004:

- Six fuzes
- 42 5-in. anti-aircraft common rounds.

All activities were performed using currently accepted practices and the standard operating procedures listed in the *Health and Safety Plan for the Removal and Detonation of Unexploded Ordnance at the INEEL* (INEEL 2002), including DOE Manual 440.1-1, "DOE Explosives Safety Manual."

2.2 Transportation

The team transported the UXO items in accordance with Plan (PLN) -320, “Transport Plan for the Movement of Explosive Materials within the Boundaries of the Idaho National Engineering and Environmental Laboratory” and with U.S. Department of Defense Series 60A procedures, including:

- Placarding the vehicle in accordance with U.S. Department of Transportation regulations
- Placing the UXO in the back of the transport vehicle into a bed of sand 3–4 in. deep with sandbags between them to keep the items from bumping into one another
- Notifying the Warning Communications Center (526-1515) before moving the items
- Driving the most direct route without stopping, except those required for traffic purposes
- Segregating fuses from UXO
- Complying with Management Control Procedure (MCP) -2725, “Field Work at the INEEL,” when moving UXO off road
- Carrying two portable 2A:10BC fire extinguishers in the vehicle
- Obeying posted speed limits.

2.3 Detonation Area Tasks

2.3.1 Detonation Area Preparation

The field team used an existing crater at the Mass Detonation Area for the detonations. The preparatory tasks included having the crater sides and perimeter graded to remove vegetation and wetted to prevent range fires. The grading also created a smooth profile that made carrying UXO into the crater safer and easier.

2.3.2 Detonation Preparation

First, the field team placed the UXO pieces side-by-side and nose-to-nose in the crater bottom. Then, the team connected an “explosive train” of Composition 4—more commonly known as C4—across all the items and pressed C4 into the noses of the items that were missing nose cones. The team added C4 to the shot to propagate the explosion so that when detonated all the items would go off like a chain reaction.

After placing the UXO items and positioning the C4 explosive train, the team “dual primed” the train by inserting an electronic blasting cap in each end; then, they connected the caps to an electrical cord and ran electrical cord about 500 yd north to a concrete camera emplacement, a leftover from the 1940s detonation tests.

2.3.3 Detonation and Post-Detonation Evaluation

After making the required notifications, the team triggered the detonations from the concrete shelter. After triggering the detonations, the team remained in the concrete shelter for 5 minutes before approaching the blast area.

Upon visiting the blast site, nothing was left in the crater except for small metal fragments. The senior explosive ordnance disposal officer determined that both shots had been high-order detonations, and all the UXO items had been destroyed.

3. REFERENCES

DOE M 440.1-1, 1995, "DOE Explosives Safety Manual," U.S. Department of Energy, September 30, 1995.

INEEL, 2002, *Health and Safety Plan for the Removal and Detonation of Unexploded Ordnance at the INEEL*, INEEL/EXT-02-01102, Rev. 0, Idaho National Engineering and Environmental Laboratory, October 2002.

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